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Applicant:	LUNDEN et al.	Examiner:	J. A. FORTUNA
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Title:	Use of colloidal precipitated calcium carbonate as a filler in the preparation of paper		

Plougmann & Vingtoft

DECLARATION BY Henrik Fordsmand

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

I, Henrik Fordsmand, Trongårdsparken 47, DK-2800 Lyngby Denmark, R&D Manager Precipitation Development, J.M. Huber Denmark ApS, Strandesplanaden 110 DK-2665 Vallensbæk Strand Denmark, Chemical Engineer, MsC, Ph.D. 23 years experience in applied particle science and technology. The last 12 years in precipitation, characterization of PCC and application of PCC in paper.

Additional to the response filed 13 August 2003 the differences between wood-containing paper and wood-free paper are herewith further illustrated.

The enclosed document is a brochure published by one of the largest paper producing groups within the papermaking industry. The brochure was published in November 2002 (see the last page) and discloses that:

- (1) wood-containing paper (Mechanical pulp, page 5, section 1.1.1) comprises fibres which are mechanically separated either by grinding or refining. If necessary the wood chips may be soften by treating the chips with steam or chemicals, and
- (2) wood-free paper (Chemical pulp, page 6, section 1.1.2) comprises pulp manufactured by pressure boiling wood chips in a chemical solution in order to remove lignin from the pulp. In this production of pulp more wood is needed and the naming "Chemical pulp" are commonly known as "pulp".

In my opinion the disclosure of the enclosed document reflect the difference between wood-containing paper and wood-free paper as they are generally recognised in the art.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statement and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United State Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: Sept 19 2003 Name: H. Fordsmand
month/day/year Henrik Fordsmand

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Curriculum Vitae

Name: **Henrik Fordsmand**
Address: **Trongårdsparken 47**
Postal code: **DK-2800**
Town: **Lyngby**
Country: **Denmark**
Phone: **+4545930034** **Mobile:** **+4528357242**
E-mail: **Henrik_Fordsmand@bbs.ida.dk**

Job experience:

Year	Employer	Line of business
1991	JM Huber Denmark ApS	R&D Manager Precipitation Development, Section Leader for PCC precipitation R&D
1989-91	DTI Taastrup	Technical Consultant
1981-89	Danit Hårdmetal A/S	R&D Engineer, and student under the Industrial Research Education Programme
1981	Instituttet for Metallære, DTU	Scientific assistant
1981	Danit Hårdmetal A/S	R&D Engineer
1980-81	Instituttet for Metallære, DTU	Scientific assistant

Education:

Year	Education
1974	Kemistudent, Ordrup Gymnasium.
1980	MSc in Chemistry, Danish Technical University.
1990	Erhvervsforsker EF191, PhD equivalent degree administrated by the Industrial Research Committee set up by the Danish Academy of Technical Sciences.

Further education/courses within last 5 years:

Year	Course
2002	Design for 6 sigma. Internal course in product development.
2001	6 sigma Green Belt. Internal course in process optimisation and process control.
2001	§9 Arbejdsmiljøkursus, Dansk Industri
2001	Advanced Rheology, Skandinavisk Teknik Förmedling
2000	Volume Scattering in Particulate Média. Internal course.

1999	"Controlling Explosions" The Fundamentals of Project Excellence. Internal course in product-development project control.
1997	Kursus i Patenter. Patentdirektoratet

Language:

Speaks and writes English fluent
 Regular conversation in Swedish.
 Reads German and practice light conversation.
 Reads French and practice light conversation.

IT skills:

Experienced user of several office packages including Microsoft Office.
 Familiar with statistical and mathematical packages (MiniTab, E-chip, Mathcad)
 Experience with dedicated software packages for analytical equipment.
 LabTech Notebook Data Acquisition and Process control software.

Personal qualifications:

Precipitation of Calcium Carbonate. Process and quality
 Application of carbonate fillers in paper.
 Processes and application of PCC paper coating pigment
 Analytical chemistry and instrumentation, mainly in inorganic chemistry and particle characterisation. Including FT-IR and X-ray spectroscopy.
 Project management of development projects.
 Statistical process control and optimisation.
 Design of Experiments using statistical methods
 Designed instrumentation of experimental pilot- and lab-scale set-ups.
 Developed on-line quality control procedure from correlation between on-line conductivity measurements and product particle size and morphology.
 Product quality responsibility at start-ups, with some process responsibility.
 Experienced in powder technology.

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The Versatile
World of Paper



VERSATILE ORGANIC PAPER

CONTENTS

The World of Paper
Brief the lifecycle of
paper from end user and
begin as raw material, and
divides into the various grades of
paper and uses: The
brochure contains a segment
on the impact of paper on the
environment. This brochure has
been designed to complement bro-
chures on paper manufacture.

As the booklet has been put
together for UPM-Kymmene's va-
rious interest groups, it contains
information only on papers in the
UPM-Kymmene range. Items such
as soft tissues or boards are thus
not included.

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Put in layman's terms, a paper machine is a water removal device that removes water from pulp through filtration, pressure and drying. Pulp pumped onto the wire is 99 per cent water, while the water content of a completed reel of paper is only 5-8 per cent, depending on grade. The most modern paper machines may be as much as 150 metres long and 12 metres wide, and run at speeds in excess of 100 km/h.

1.1 Raw Material for Paper

Paper is primarily manufactured from wood fibre that is processed into mechanical or chemical pulp. Thanks to recycling, the original wood fibre can be used several times in the manufacture of paper.

1.1.1 Mechanical Pulp

In the manufacture of mechanical pulp the fibres are mechanically separated either by grinding or refining. The wood chips may also be treated in advance with steam or chemicals to soften the wood so that the fibres remain as intact as possible during the separation process. This results in stronger pulp. Spruce is the main raw material for mechanical pulp. The utilisation ratio in mechanical pulping is extremely high; raw material is converted almost in its entirety.

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Abbreviations

The terms 'wood containing paper' or 'mechanical paper' are used when referring to paper manufactured from mechanical pulp. Mechanical printing papers contain upwards of 25 per cent mechanical pulp, depending on grade; in general, their mechanical pulp content exceeds 50 per cent. Chemical pulp is added as necessary to increase paper strength. The paper may also contain fillers or mineral pigments and binding agents in the coating.

One advantage of paper manufactured from mechanical pulp is its good opacity and printability even at low basis weights. Price and the usability of low basis weights make mechanical papers a more economical alternative than woodfree papers. The only factor restricting the use of mechanical papers is the tendency of mechanical pulp to turn yellow when exposed to daylight, limiting the archivability of these papers. Magazines, newspapers and advertising materials are only a few of the numerous uses for mechanical papers.

1.1.2 Chemical Pulp

Chemical pulp is manufactured by pressure boiling wood chips in a chemical solution. Chemical treatment removes lignin, the wood's natural binding agent, from the pulp to ensure better preservability. More wood is needed for the manufacture of chemical pulp – or just pulp, as it is commonly known – because of this process of delignification, as it results in a utilisation rate of some 50 per cent. Chemical pulp is usually sulphate pulp manufactured by an alkaline method. Environmental concerns have led to a lower share of production capacity being set aside for sulphite pulp manufactured by an acid method. The raw material for sulphite pulp is spruce, while also pine and birch can be used in the manufacture of sulphite pulp. All UPM-Kymmene pulp mills manufacture sulphite pulp.

Printing paper manufactured from pulp is often referred to as 'woodfree paper' even though its raw material is wood fibre. Woodfree printing papers are coated or uncoated papers made of bleached pulp with less than 10 per cent mechanical pulp and a filler content of 10 to 30 per cent. The prime properties of woodfree papers are strength, rigidity, high brightness and archivability. Another name for woodfree printing papers is 'fine papers'.

Unbleached woodfree paper is called kraft and its uses include envelopes, sacks and wrapping papers.

1.1.3 Recycled Pulp

Recycled pulp is an important raw material to the paper industry. The type claimed paper and the deinking method employed in manufacture determine the quality of the resulting pulp and its suitability for the manufacture of various paper grades. Recovered

fibres can be recycled 5–7 times, though paper grade also affects the number of times paper can be recycled. Woodfree papers, for example, endure recycling for substantially longer than newsprint. Recycled pulp is a good raw material for the manufacture of newsprint and MF speciality grades, and nowadays even magazine papers may contain recycled fibres. Nevertheless, it's worth bearing in mind that without virgin fibres there would be no recovered fibres.

1.1.4 Bleaching

Both mechanical and chemical pulp is manufactured as bleached and unbleached. Chemical pulp is bleached in order to remove any remaining lignin, resulting in archivable white paper. Mechanical pulp may be bleached to heighten the brightness of the fibre. Also recycled pulp can be bleached to obtain higher-quality paper. UPM-Kymmene utilises either the ECF (Elemental Chlorine Free) or TCF (Totally Chlorine Free) method in bleaching pulp.

1.1.5 Filler and coating pigments

After wood fibre, mineral-based filler and coating pigments such as kaolin, talc and calcium carbonate as well as binding agents are the second most important raw material in paper manufacture. They affect the characteristics of paper, such as opacity, printability and the paper's base structure.

1.2 Paper Finishing

Finishing, along with pulp properties, exert a major influence on the look and functionality of paper.

Surface sizing

The surface sizing of paper makes it moisture resistant and gives it strength, smoothness and gloss. Both starch and latex may be used as surface-sizing agents.

Machine finishing

Machine finishing improves the smoothness of paper and allows adjustments in paper thickness.

Coating

Coating enhances the appearance and printability of paper. Coating colour consists of pigments (clay, talc or carbonate) and binding agents (starch, latex). Paper may be coated once, twice or even three times.

Supercalendering

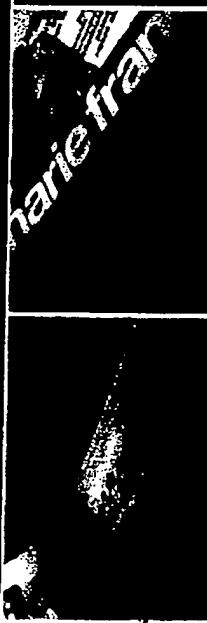
Supercalendering gives paper a smooth, glossy surface.

Mat calendering

Mat calendering can be used to give paper a silk or matt surface that enhances readability.

Cutting

A finished paper reel that comes off the machine can weigh up to 100 tonnes. It is cut into rolls or sheets of the correct width and length as specified by the customer, after which the paper is sent on to the packaging department.



2.1 Newsprint

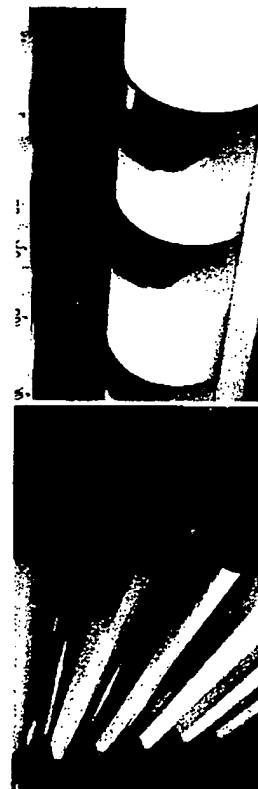
Newsprint is manufactured either from mechanical pulp or recycled fibre. It is the most economical paper grade with respect to information capacity, and as a standardized product newsprints from different manufacturers are interchangeable. Mills that manufacture newsprint usually focus on local markets to maintain not only low production costs but also low transportation costs.

Newsprint tends to be lightweight. Low basis weights are particularly popular in the printing of newspaper supplements. In recent years, average basis weight has continued to fall as lighter paper produces savings in transportation, handling and storage.

Uniform quality is a prime consideration for newsprint because uninterrupted operations are a critical factor in the printing of newspapers. The most important technical characteristic of newsprint is consistently reliable runnability.

Newsprint is the most commonly used paper grade in terms of quantity. As its name suggests, it is mainly used in the printing of newspapers, but magazines and less demanding advertising materials can also be printed on newsprint. Free newspapers are usually printed on standard newsprint or on 'special newsprint' with higher brightness (see MF special grades). Coloured newsprints are also used both for newspapers and newspaper supplements.

These days, the most common printing method for newsprint is coldset offset, although letterpress and flexo printing can be used as well. UPM-Kymmene manufactures a grade of newsprint also suitable for heatset offset printing.



2.2 MF Specialty Grades

Machine finished, or MF specialty grades are manufactured from mechanical pulp or recycled pulp. The nature of these papers is 'tailored', meaning that papers are manufactured to meet the demands of a variety of uses. Characteristics peculiar to MF grades are good brightness, surface structure and bulk.

2.2.1 Bleached MF Papers

Bleached MF papers may be both machine finished and soft-calendered. Machine finished mechanical MF grades with high brightness obtained by bleaching the pulp are especially suitable for four-colour printing and print jobs that call for a higher basis weight than that of standard newsprint.

Bleached MF papers may be used instead of magazine papers when high bulk and low basis weight are required.

Bleached MF papers have been specifically developed for the ink absorption necessary in coldset offset printing. These grades are increasingly being used in heatset offset printing as well, in which case the rheological properties (viscosity) of the ink need to be adjusted to suit the paper's surface resistance. Grades may also be used in rotogravure printing.

2.2.2 Coloured Newsprints

Coloured newsprints fall into the category of MF specialty grades. In all technical respects, these papers are very similar to ordinary newsprint. The most common colours are salmon, pink, yellow, orange, blue and green.

Coloured newsprint is used mainly for newspapers and newspaper supplements.



2.2.3 MF Directory Papers

MF directory papers, both white and coloured, are found in telephone directories, technical catalogues, timetables and special Sunday editions of newspapers. Directory papers are another example of 'tailored' papers.

Because of their uses, directory papers tend to have low basis weight.

2.2.4 Bulky Printing Papers

Bulky printing papers are used to print paperbacks and comic books. High specific volume, or bulk, is a characteristic typical of these papers. It makes them seem thicker than normal. Bulky printing paper is also rigid, which is why printed matter made with it feels firm despite the thinness of the paper or the small number of pages.

2.2.5 Mechanical Book Papers

Mechanical book papers are available in a wide range of brightness and bulk. The paper has not been surface sized and contains a high percentage of mechanical pulp. Nowadays mechanical book papers are increasingly being used for multi-colour printing. Though the traditional coldset offset printing machine is still used with book papers, the heatset offset printing method can also be employed with papers of this grade provided that the rheological properties (viscosity) of the inks are adjusted to suit the paper's surface resistance.



2.3 Magazine Papers

Magazine papers are primarily manufactured from mechanical pulp and can be grouped into three 'families': uncoated machine finished (MF) and supercalendared (SC) papers, and coated magazine papers. There are several sub-groups within each group to meet the requirements of a variety of printing methods and end uses.

2.3.1 SC Papers

SC paper is the most economical magazine paper in terms of information capacity and cost.

There are several sub-grades of SC paper. SC-A+ is brighter than standard SC paper and has better surface characteristics. SC-A+ paper is used for demanding sales catalogues, magazines and special magazines, supplements and advertising materials. SC-B and SC-C papers have lower brightness and inferior surface quality; they are mainly used for print jobs in which low paper costs are a key concern.

SC grades with either a matt or glossy finish are manufactured for rotogravure and offset printing.



SC offset Papers

SC offset paper (SCO) has been developed from the SC rotogravure grade. The characteristics of SCO are similar to those of SC rotogravure paper but a separate pulp treatment makes it suitable for offset printing. SC offset paper is particularly suitable for the printing of TV guide supplements, advertising materials and Sunday newspaper supplements as well as other products that call for good information capacity. The application of modern heatset offset printing technology gives a successful printing result. SC offset paper is also available in a number of sub-grades similar to those of SC rotogravure papers.

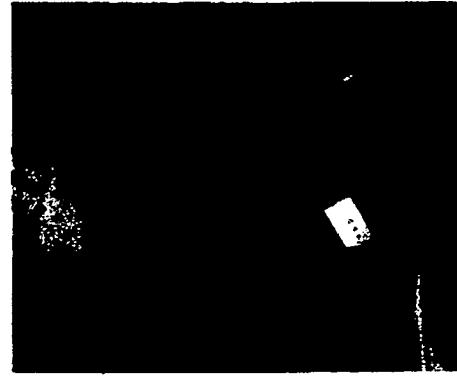
2.3.2 Coated Magazine Papers

MFC (Machine Finished Coated)

The specific volume, or bulk, of machine finished coated magazine paper (MFC) is exceptionally high. MFC is more rigid than LWC paper. Its matt surface and high brightness enhance readability, while the smooth surface absorbing little ink provides a glossy picture plane that ensures colour intensity and gloss contrast – both important factors in the printing of pictures.

MFC papers are usually printed in heatset offset. Suitable applications include special magazines and various types of advertising materials and educational publications.

The most recent addition to coated magazine papers is a magazine paper designed for coldset offset printing. Its uses include newspaper supplements, advertising materials and special magazines.



LWC (Light Weight Coated)

Lightweight coated LWC grades are suitable for print jobs that call for high information capacity. The demands of the coating process on base paper give LWC paper exceptionally good strength.

LWC paper is used for magazines and sales catalogues that feature a large number of advertisements and colourful pictures. This grade has even been nicknamed 'the advertiser's paper' for its particularly good gloss and brightness.

LWC paper is manufactured to meet the demands both of the heatset offset and rotogravure printing methods; the range of LWC offset grades also includes matt grades.

MWC (Medium Weight Coated)

Double coated MWC paper has the highest information capacity among mechanical grades. Double coating gives the paper an even surface, excellent smoothness and good gloss. The even surface provides for low dot-gain in offset printing, which is why the paper is used in difficult four-colour printing such as magazines and special magazines, magazine covers, special sales catalogues and advertising materials.

MWC paper is primarily manufactured for offset printing but an excellent printing result can also be obtained in rotogravure printing through the use of electrostatic assistance (ESA).

2.4 Fine Papers

2.4.1 Uncoated Fine Papers

Uncoated fine papers are a large group of machine finished paper grades used for a multitude of print jobs such as advertising materials, books, maps and office papers. Increased smoothness is only one of the ways in which uncoated fine papers have been further improved for various uses. The paper is available in a wide range of basis weights, reaching from papers with very low basis weight to near cardboard-like paper.

2.4.2 Coated Fine Papers

Coated fine papers have been designed for demanding printing. The amount of coating, surface gloss and other special characteristics vary according to what the paper is to be used for.

Fine papers may be coated once, twice or three times and their surfaces can be matt, silk or glossy.

The very highest-quality coated fine paper is called art paper and it is used in the printing of art books, annual reports and deluxe advertising materials. Lightweight coated fine papers have a wide range of applications – magazines and magazine covers, advertising materials, brochures, books and catalogues.

Fine papers are printed either in heatset offset or sheet fed offset.



2.5 Office Papers

The majority of office papers are uncoated fine papers. Contrary to expectations, the consumption of office papers has increased significantly in spite of the advances made in data transfer technology.

2.5.1 Writing Papers

Examples of writing papers include notepads and school copybooks. Writing paper must have good writability and suitable surface characteristics.

2.5.2 Stationery Papers

Stationery is used when printing out various kinds of computer files and lists (continuous stationery), and for invoices and statements posted to customers by banks and insurance companies.

Stationery is pre-printed and delivered to the customer as reels or A4-sized sheets, or folded-up in the case of continuous stationery.

Stationery needs to have good fundamental characteristics such as strength, purity and dimensional stability. The reason for this is the fairly long handling chain through which form paper must pass; mill – processing – printing – mailing – end user.



2.5.3 Copy Papers

The use of copy papers has increased the world over. The wide range of copier brands places extremely exacting demands on the paper. Copy paper must run faultlessly through the copier. Copy papers must not curl or dust and they need excellent dimensional stability in order to meet the requirements of progressively more common double-sided copying. Copy papers may be used both in copiers and in printers.

2.6 Digital Printing Papers

Market support and technological advances have enabled the spreading of digital printing to an ever-growing range of applications. Digitally printed products are expected to match offset printing quality, necessitating the introduction of new paper grades from fine papers to newsprint.

Items that are primarily digitally printed include brochures, advertising materials and catalogues. Digital applications have made possible short print runs of four-coloured products, while digitally printed single-colour products include invoices, catalogues and books. In traditional single-colour products, digital printing is used for personalisation or the additional information value obtained through colour.

New applications include the remote printing of newspapers to ensure that daily newspapers can be delivered on the date of issue even to subscribers living far from the printing press.

Digital printing technology puts new demands on paper. Since paper dries up during the heating used for setting ink, it must have a proper moisture content and good dimensional stability. As in offset printing, the paper may not become rough or change colour when heated. Further demands include controlled electrical and surface chemical properties to ensure smooth ink transfer and setting.

Certain digital processes require higher paper rigidity or friction than traditional offset printing machines. The digital process also calls for cleanliness, so the paper should not dust, and quality must always be flawless. Reels of digital paper are often narrower than normal.

Above all, digital paper must look and feel the same as the paper grades used in traditional printing.



2.7 Speciality Papers

2.7.1 Envelope Papers

Envelopes are primarily manufactured from uncoated woodfree paper and brown kraft, and from coated woodfree paper for direct marketing purposes. Types of envelope vary from plain white to brown bags open at one end. The most important characteristics of envelope papers include proper rigidity, low porosity, good printability, strength and recyclability.

2.7.2 Sack Papers

Sack papers are usually kraft made from bleached or unbleached sulphate pulp. Sack paper may either be unglazed (UG) or a lightly creped grade known as clupak. In some cases, especially the crosswise extensibility of sack paper can be improved by airborne drying.

Modern sack manufacture calls for great strength and porosity of paper. Strength is essential to the durability of packaging and the minimisation of raw material use, while porosity facilitates the quick, dust-free sacking of powdered materials such as cement. Friction is a major contributor to stability when sacks are stacked and transported.

The interior of sacks is usually made of brown paper. The outer surface may be white, enabling a better print result.

2.7.3 Bag papers

Bags are mostly manufactured from white kraft, though brown kraft is also used. The paper may either be machine finished (MF) or machine glazed (MG).

Typical end uses for bag paper are flour and sugar bags, carrier bags and various types of bags e.g. for bread, sweets and fast foods. Essential characteristics include strength, good runnability, purity and printability.

2.7.4 Technical papers

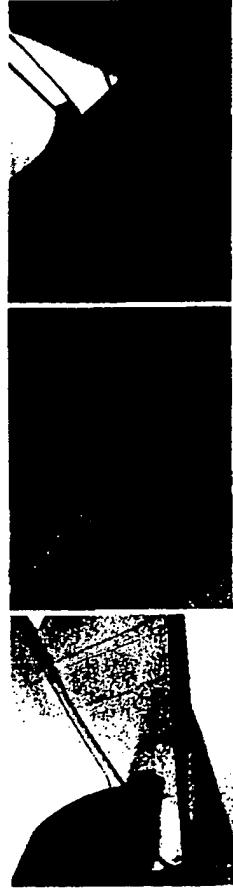
Technical papers, or industrial papers, as they are also known, refer to a variety of kraft grades which can be treated with plastic, aluminium, bitumen, silicone or wax. They can also be used as a base paper in the manufacture of abrasive papers.

End uses for technical papers include:

- industrial wrappings and packages such as wrappings for reels, reams and steel
- paper tape
- base papers for industrial purposes
- insulating papers for the construction industry
- abrasive papers and sand papers
- paper sticks (uses include cotton swab and lollipop sticks)
- spinning papers that can be twisted e.g. to make paper yarn
- interleaving papers for the steel industry to protect sheets; exceptional purity and smoothness is required of these papers to avoid damage to the sheets.

2.7.5 Flexible Packaging Papers

Uncoated or coated papers and kraft are used as flexible packaging papers, either as such or laminated with plastic, aluminium or other materials. Major users of flexible packaging include the powdered food, tobacco, and confectionery industries.

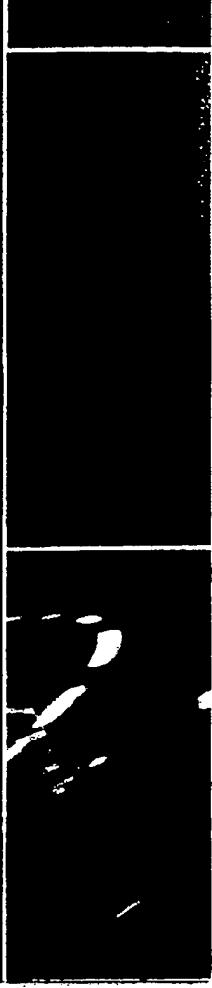


2.7.6 Label Papers
Label papers are most commonly one-side coated papers used to make labels for a multitude of products ranging from glass jars and tins to bottles of beverages. The wet strength characteristics of the paper may vary depending on end use.



2.7.7 Adhesive Papers

Adhesive papers are divided into face papers and base papers. Face papers are either one-side coated and pigmented or uncoated woodfree papers, while base papers are supercalendered kraft papers coated with silicone to produce release characteristics.



2.7.8 Labels

Labels are printed onto adhesive paper using a variety of printing methods.

3.1 Coldset Offset (Coldset web offset/CSWO)

In coldset offset printing, ink is first transferred from the printing plate onto a rubber 'blanket' cylinder and then onwards onto the paper. The ink dries through absorption into the paper and evaporation. The printing surface and non-printing surface of a printing plate are level but have a different surface tension. Coldset offset printing is mainly used in newspaper printing.

3.2 Heatset Offset (Heatset web offset/HSWO)

The heatset offset printing method is similar to coldset offset when it comes to the actual printing but the two methods employ different types of inks. Ink is transferred from the printing plate onto a rubber blanket and then onwards onto the paper. The ink is then dried, for a mere second, at the high temperature of a dryer, or 'ovcn'. The printing and non-printing surface of the printing plate are level but they have a different surface tension. Due to low initial outlays, the heatset offset printing method is suitable for a variety of purposes. It is mainly used in the printing of magazines and advertising material.

3.3 Rotogravure (RG)

In the rotogravure process, ink is transferred onto paper from small recesses engraved either mechanically or by laser into the impression cylinder. Each shade of ink is dried separately at a high temperature before the next colour is printed. Rotogravure is best suited to the printing of wide-circulation catalogues and magazines.

3.4 Sheet fed Offset

The actual printing in sheet fed offset is the same as in the CSWO and HSWO processes except that the inks are dried through oxidization.

The sheet fed offset printing method is used in the printing of graphic papers and packages.

3.5 Letterpress

In letterpress printing, ink is transferred onto paper from the raised surfaces of a relief plate or printing plate. The ink dries through absorption and evaporation. Letterpress printing is nowadays used mainly for short print runs of business cards, invitations, forms and the like. In earlier times, also telephone directories and newspapers were printed in letterpress.

3.6 Flexo

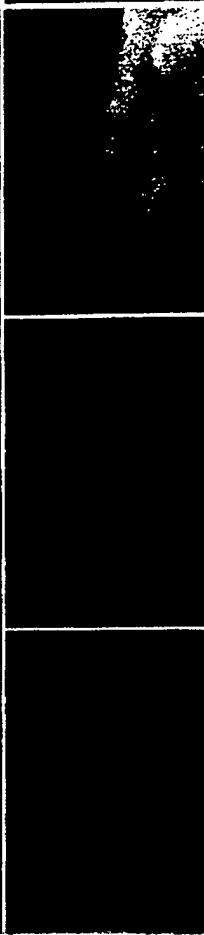
Flexo is a variation of letterpress printing with a printing plate that is flexible in the direction of compression. Ink is transferred onto paper from the raised surfaces of a relief plate or printing plate and dried through absorption and evaporation. Flexo printing is mainly used in the printing of packages and wrappers; sometimes newspapers are also flexo printed.

3.7 Digital Printing

Digital printing is the most rapidly growing printing method. It offers a number of advantages over traditional printing methods, most importantly flexibility. Changes can be made up to the very last minute, even when documents are already being printed. This flexibility enables the updating of information and individual print runs with changing contents. Digital printing also allows different images and texts to be placed into different versions of a single document. Another significant advantage of digital printing is its greater affordability for short print runs.

In digital printing, the material being printed remains in digital form until printed onto the chosen surface. Documents are imaged on paper by the projection of ink.

Digital printing is particularly suited to short print runs, whether of cards, direct mail materials, books or newspapers.



4.1 Procurement of Raw Material

Paper is primarily manufactured from wood fibre. The procurement of raw material is thus the first point of contact with the environment in the manufacturing process, while the first step in environmental consideration is responsible and sustainable forestry and environmentally aware harvesting. UPM-Kymmene's wood procurement complies with the principles of sustainable development. The origin of all wood can be traced easily and through a variety of methods.

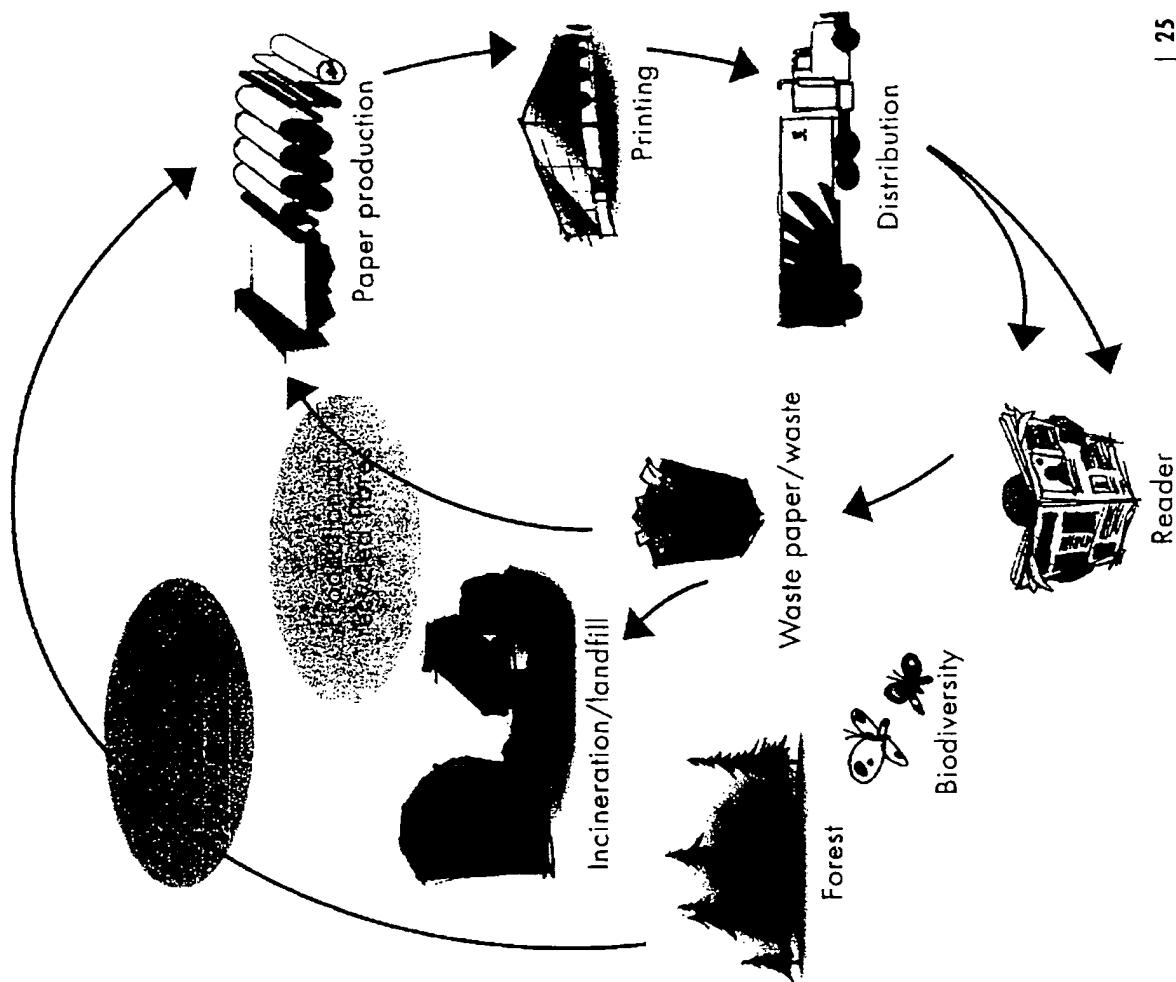
Impacts on the forest environment are assessed on the basis on ecological, aesthetic and social values. Modern forest management has discovered methods to ensure that biodiversity is maintained in commercial forests. The most valuable forest sites are protected, active measures are taken to increase the amount of rotting wood essential to endangered species, deciduous trees are favoured amidst coniferous forests and attention is paid to water protection and landscape conservation.

4.2 Paper Production

Pulp and paper production generates emissions into the air, water and soil. Emissions are mainly reduced by process-internal measures complemented by external purification.

Significant emissions into the air include sulphur, nitrogen and carbon oxides, which are generated mainly in energy production. Malodorous TRS emissions are a result of pulp manufacturing. Emissions can be reduced by the effective use of energy, choice of fuels, incinerator adjustment and purifying the flue gases.

PAPER'S LIFE CYCLE



Wastewater released into the water system contains solids and oxygen consuming compounds as well as organic chlorine compounds from the mills. The organic element contained in wastewater reduces oxygen levels and its nutrients have a eutrophic effect. All wastewater is treated before it is allowed to enter waterways and the amount of emissions is measured and monitored on a regular basis.

Solid waste resulting from paper production is utilised whenever possible, for example in landscaping and as material for earthwork sites. Organic process waste is used as fuel in energy production. All remaining solid waste is taken to supervised landfills while hazardous waste is delivered to appropriate treatment plants.

4.3. Transport

Transportation of raw materials and finished products accounts for a significant portion of the environmental impacts of paper. Lorry transports are replaced by railway transportation whenever possible, while optimised route planning and the implementation of the latest technology further reduce the environmental impacts of transportation.

ABBREVIATIONS

Abbreviations and acronyms used to describe surface finishing

ABBREVIATIONS	
Abbreviations and acronyms used to describe surface finishing	
Gloss	Supercalendered, high gloss
Matt	Matt calendered
MC	Matt calendered
MF	Machine Finished
MG	Machine Glazed
Satin	Matt calendered, very smooth
SC	Supercalendered
Silk	Matt calendered, very smooth
UG	Unglazed
Other abbreviations and acronyms	
C1S	Coated one side
DIP	Deinked pulp
ESA	Electrostatic Assistance
FCO	Film Coated offset
HD	High Density greaseproof paper
HWC	Heavy Weight Coated magazine paper
LWC	Light Weight Coated magazine paper
MFC	Machine Finished Coated mechanical paper
MFS	Machine Finished Specialities
MWC	Medium Weight Coated double-coated printing paper
News	Newspaper
OCR	Optical Character Recognition optically readable papers
OMG	Old magazines
OMP	Old newspapers
OTC	One time Carbonizing Paper
OWP	Office waste paper
RCF	Recycled fibre content
TD	Telephone Directory directory paper
PPP	Papier pour la Presse newspaper (an old term for any paper on which a newspaper is printed)
WFC	Woodfree Coated
WFU	Woodfree Uncoated
ULWC	Ultra Light Weight Coated

Pulp bleached without chlorine gas

CGF Chlorine Gas Free

ECF Elemental Chlorine Free

Pulp bleached without chlorine compounds

NCC Non Chlorine Compound

TCF Totally Chlorine Free

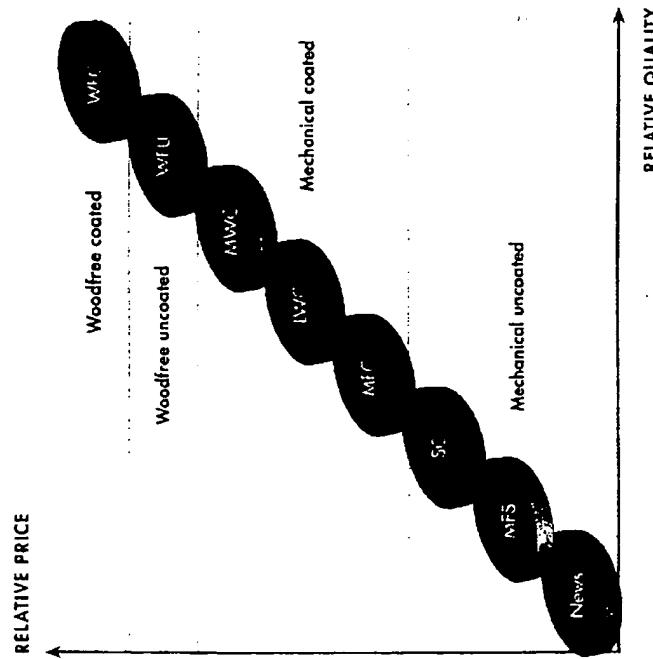
ACF Absolut Chlorine Free

EXAMPLES OF END USES

Raw material	Paper grade	End use examples
Mechanical pulp and/or recycled pulp	Newsprint	newspapers, newspaper supplements, inserts
Chemical and mechanical pulp and/or recycled pulp	Mechanical speciality paper	newspaper supplements, directories, magazines, books, catalogues, advertising material
Chemical pulp	SC papers	magazines, catalogues, newspaper supplements, inserts, advertising material
	Coated mechanical papers	magazines, catalogues, newspaper supplements, inserts, advertising material, books, direct mail
	Speciality papers	label papers, label release papers, food wrapping, packaging material
	Woodfree uncoated papers	office papers, writing papers and envelopes, direct mail, magazines, books, advertising material
	Woodfree coated papers	magazines, brochures, direct mail, annual reports, books, advertising material
	Kraft papers	sacks, bags, wrapping and packaging papers, envelopes

PRINTING PAPERS RANGE

UPM-Kymmene PRODUCT RANGE



UPM PRINTING PAPERS

UPM FINESSE	UPM STAR	UPM CAT	UPM BRITE
UPM FINE	UPM ULTRA	UPM LUX	UPM OPALE
	UPM COTE	UPM MAX	UPM BOOK
	UPM SATIN	UPM ECO	UPM COLOR
	UPM MATT		

UPM OFFICE PAPERS

YES PHOTO INKJET	FUTURE IMAGETECH	UPM PRE LASER
YES COLOR COPY	FUTURE COLOR INKTECH	UPM PRE PERSONAL
YES COLOR INKJET	FUTURE INKTECH	UPM PRE PERSONAL+
YES GOLD PRESENTATION	FUTURE MULTITECH	UPM PRE PREMIUM
YES SILVER MULTIFUNCTION	FUTURE LASERTECH	UPM PRE INSERT
YES BRONZE COPY/PRINT	FUTURE OFFSET TECH	
	FUTURE TCF	

UPM Digi PAPERS

UPM DIGI ART GLOSS	UPM MAIL
UPM DIGI ART MATT	UPM LABEL PAPERS
UPM DIGI FINESAT	UPM BAG PAPERS
UPM DIGI COTE	UPM SACK PAPERS
UPM DIGI BRITE	UPM TECH PAPERS

UPM SPECIALITY PAPERS

UPM MAIL
UPM LABEL PAPERS
UPM BAG PAPERS
UPM SACK PAPERS
UPM TECH PAPERS

